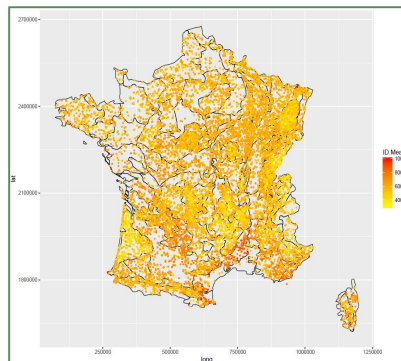


XyloDensMap

Analysis and modelling of the wood density variability of the French forest species for the assessment of the forest biomass under climatic change

Leban JM^[1,2], Baptiste Kerfriden^[2], Bontemps JD^[2],

And all the engineers and technicians from the
French National Forest Inventory groups^[3], the Xyloscience Platform^[4]
and the Radiolor medical staff ^[5]



- 1- BEF-EFPA, INRA Champenoux
- 2- Laboratoire de l'Inventaire Forestier, IGN, Nancy
- 3- Institut national de l'information géographique et forestière
- 4- INRA Champenoux
- 5- Radiolor, Medical Xray tomography, Clinique Louis Pasteur, Essey-les-Nancy



XyloDensMap

- Forest ressources are increasing in France and in Europe

Sweden, from 1500 millions m³ up to 3000 millions m³ within one century

France, from 1350 millions m³ up to 2600 millions m³ within half a century

- Changes are on forest areas, species forest composition, forest growth, ownership, management, under climatic change

New basic knowledge is required to understand the processes behind these changes

- NFI surveys are well suited for the acquisition of new knowledge

They provide annual forest information, their financial support is safe, additional information can be obtained at low additional cost, they have data management

- We introduce in the French NFI an innovative process aiming at collecting,

during four consecutive years

all the increment cores sampled by the NFI field staff

for the measurement of their wood density, shrinkage, moisture content etc.



the XyloDensMap Project

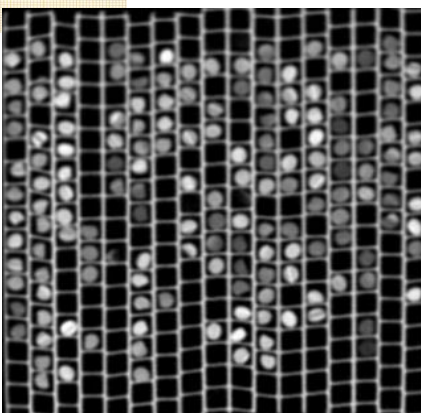
XyloDensMap

Low cost method for the wood density
measurement of 30000 increment cores/year

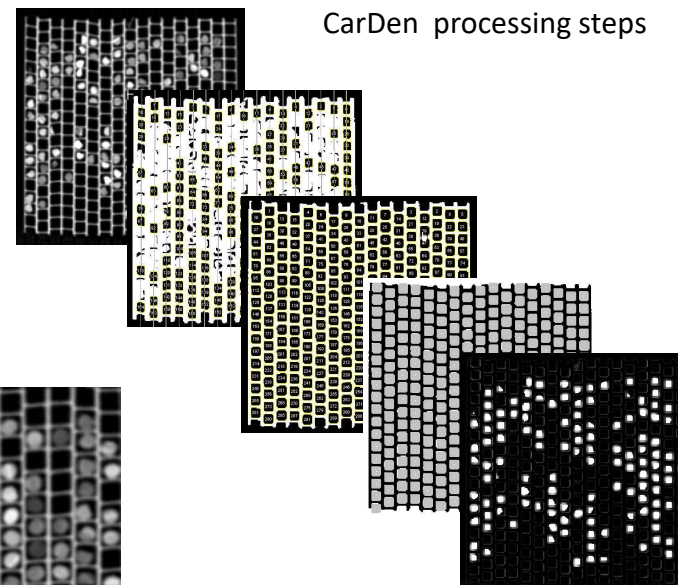


Optical scan for bark thickness measurements

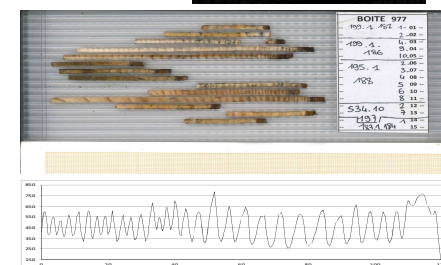
In hospital, the
Xray scanning
of 9000 cores
is performed
in one hour



Scan of 1530 cores (15*17*6), Section of a bench of 17 core boxes

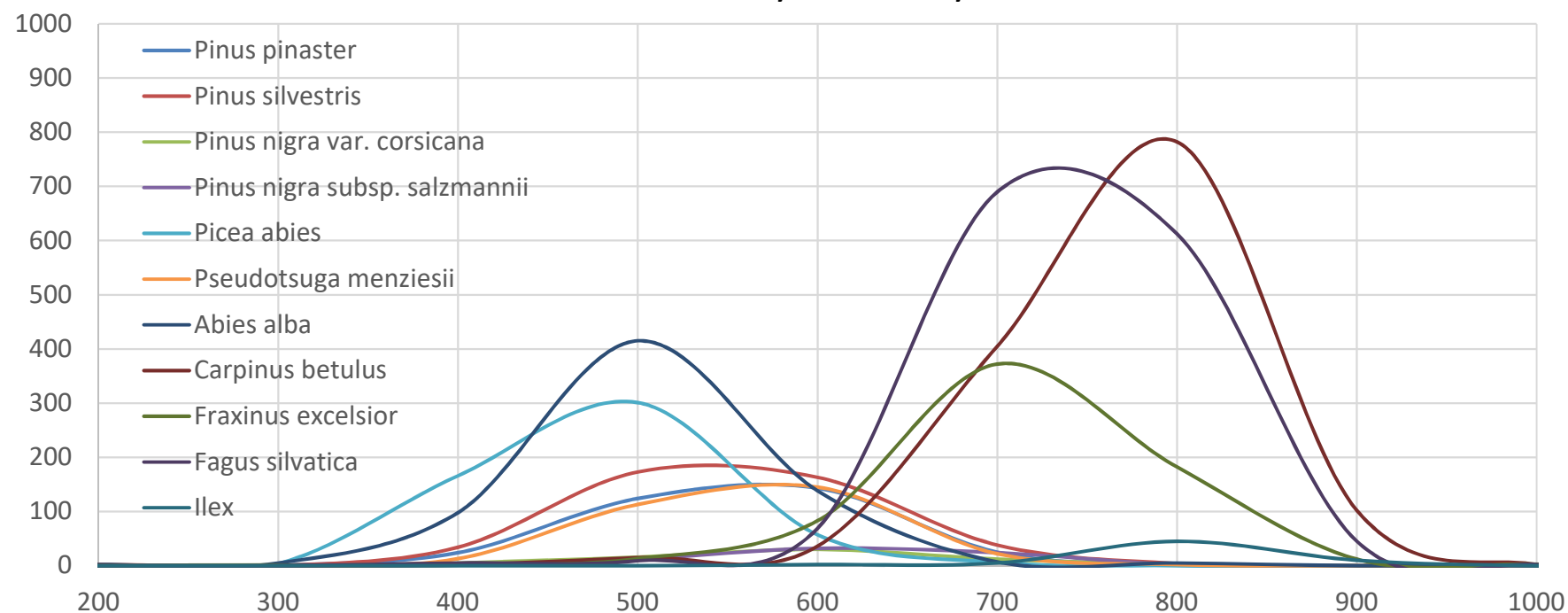


CarDen processing steps



XyloDensMap

Wood density variability

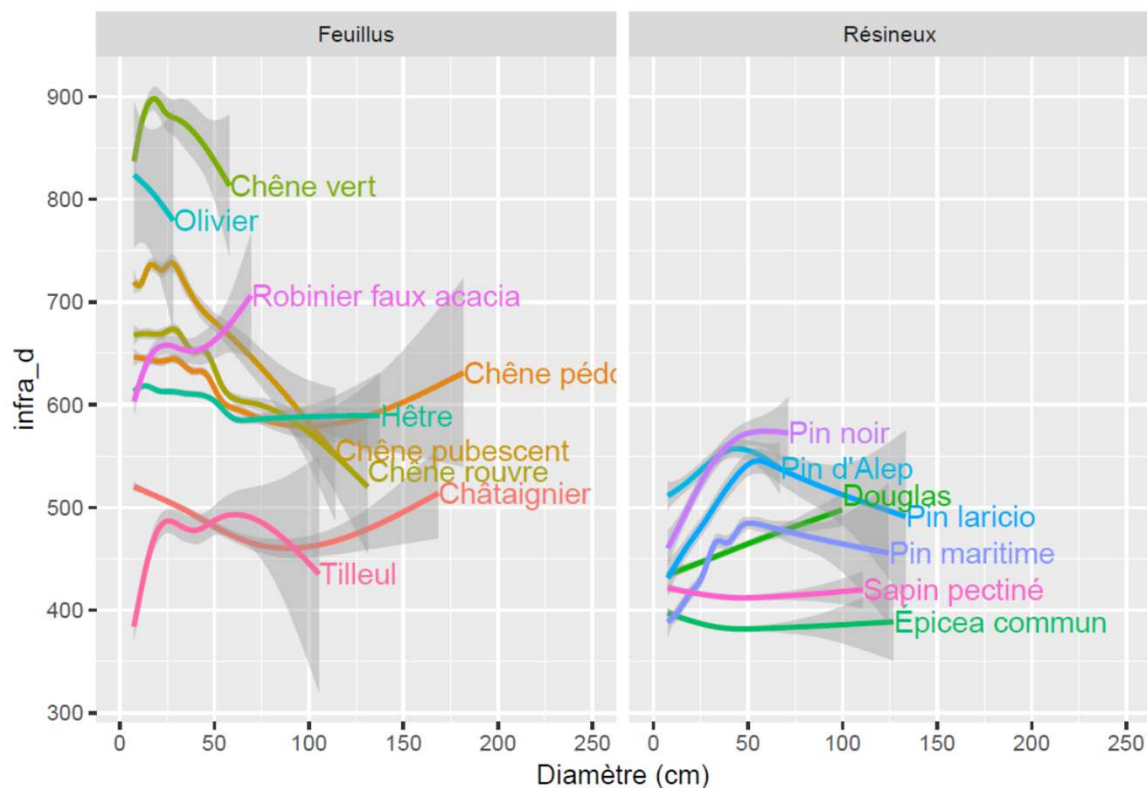


XyloDensMap

Wood density variability

Results, examples

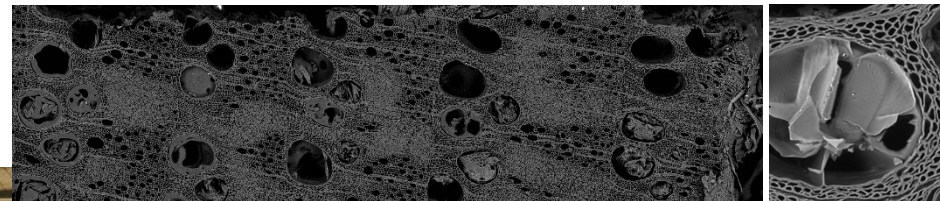
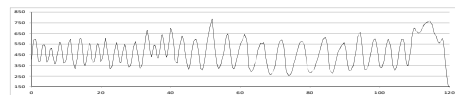
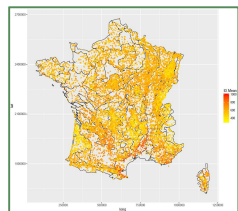
- Average tree wood density varies with tree DBH
- The pattern of variation is species dependant
- Wood density models are in progress



XyloDensMap

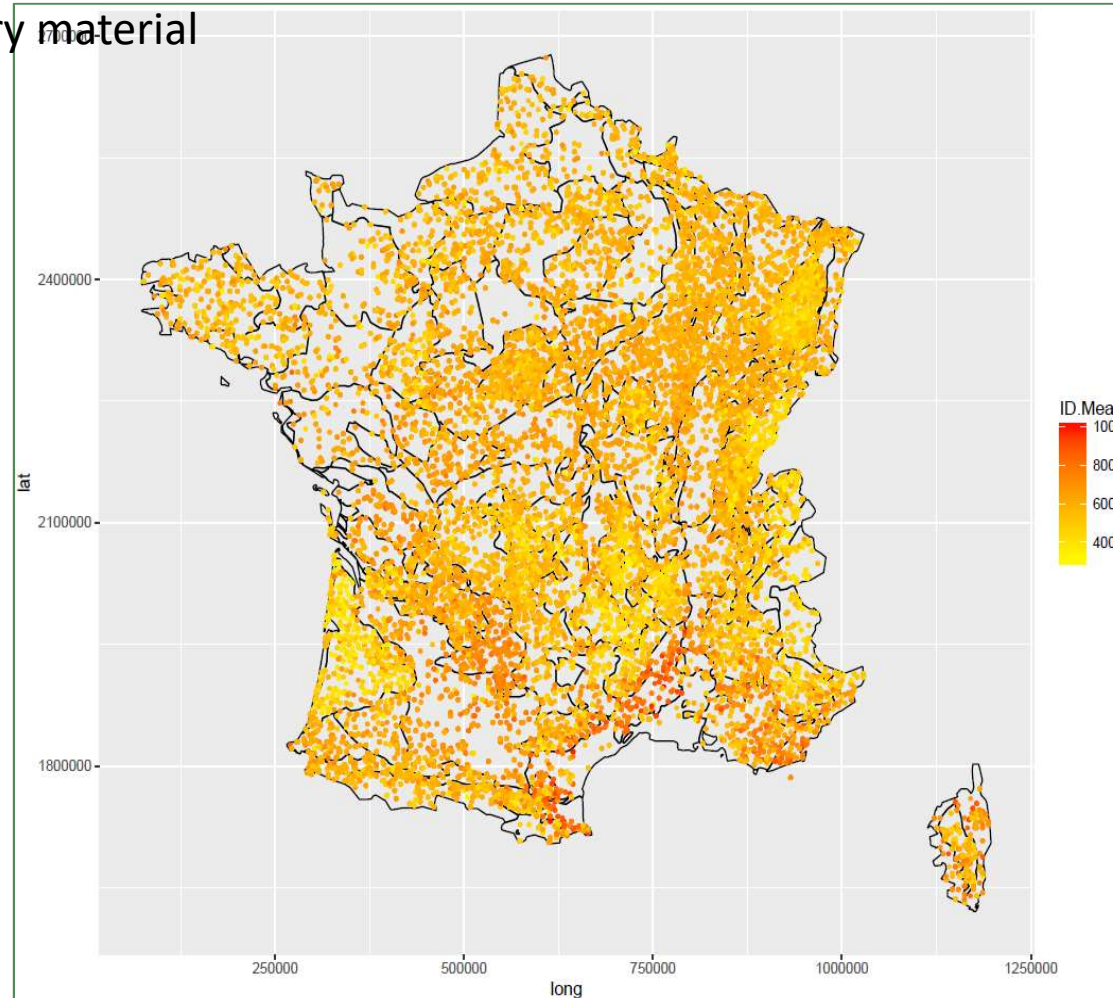
Conclusions

- Results
 - Xylotheque for all the 130 French forest species (110 000 cores)
 - Wood density data base (wood density profiles, shrinkage, moisture content, wood anatomy), implemented in the NFI data base
- In progress
 - Models of forest biomass variations =f(management, ownership, location, climate, stand age, species)
 - Wood anatomy variability along the different ecological gradients
- Perspectives
 - Simulation of the forest biomass increments variations under climatic change scenarii
 - Wood chemical properties including mineral content
 - Improving our understanding of the climate change effects on the biomass variations at the scale of the whole French forest ecosystem, by including wood properties in forest inventories



XyloDensMap

- Supplementary material



XyloDensMap

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1 - BEF, INRA / 2 - LIF, IGN / 3 - IGN, 4-SILVA, INRA

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Delhay Julien
Morneau François
Picot René
Socard Didier
Touzet Thierry
Versavel Jérôme

ALIX Jean Patrick
ANTONOT Francis
BAIOCCHI Thierry
BAYLE Elise
BELLETTIER David
BENOIT DE
COIGNAC Sylvain
BIRCKER Loïc
BLOND Wilfried
BOITHIAS Bernard
BOLLAND Patrice
BOULAY Fabrice
CANO Roger
CARCROSSE Emmanuel
CARRARO Julien
CAUMONT Luc
CEPPARO Sébastien
CHATON Jean-Paul
CHERMETTE Robert
CHRETIEN Fabrice
COURTES Jean François
DAUBIGNEY Lénéaïc
DAVIAUD Jean François
DEFONTAINE Vincent
DELAYAT Jean-Marc

DELQUAIRE Philippe
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GUICHARD Raymond
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LALLEMANT Gil
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LE BARILLIER Franck
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LORIENTE Claude
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RICHARD Pascal
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VAILLOT Jean Baptiste
VIDEAU William
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TAUPIN Amélie

Cornu Emmanuel
Freyburger Charline
Gelhay Pierre
Haroué Maryline
Motz Adeline

Xyloscience Platform

